

Remarks:

Reconsideration of the application is requested.

Claims 1-20 remain in the application. Claims 2, 4, and 9 have been amended. A marked-up version of the claims is attached hereto on a separate page.

In items 2 and 3 on page 2 of the above-identified Office action, claims 2 and 11 have been rejected as being indefinite under 35 U.S.C. § 112.

More specifically, the Examiner has stated that regarding claim 2 "forming the amorphous layer" selection of amorphous layer in claim 1 is not definite. Claim 2 has been amended so as to facilitate prosecution of the application. Therefore, the rejection is now moot.

Support for these changes may be found in Fig. 1c and on page 10, lines 1-5 and page 17, lines 7-9 of the Specification of the instant application.

Regarding claim 11 the Examiner stated that "carrying out the ion implantation process" of claim 11 lacks antecedent basis. Claim 11 has been amended so as to facilitate prosecution of

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the application and is now dependent on claim 10. Therefore, the rejection is now moot.

It is accordingly believed that the specification and the claims meet the requirements of 35 U.S.C. § 112, first and second paragraphs. Should the Examiner find any further objectionable items, counsel would appreciate a telephone call during which the matter may be resolved. The above-noted changes to the claims are provided solely for cosmetic or clarificatory reasons. The changes are not provided for overcoming the prior art nor for any reason related to the statutory requirements for a patent.

In item 5 on page 2 of the Office action, claims 1, 8, 9, 12-16, 19, and 20 have been rejected as being fully anticipated by Turner et al. (U.S. Patent No. 5,792,700) under 35 U.S.C. § 102.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

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Claim 1 calls for, *inter alia*:

producing a doping at a surface of the semiconductor substrate.

The Turner et al. reference discloses a technique for enhancing or enlarging the size of polysilicon grains in a polysilicon film atop a semiconductor wafer (column 1, lines 38-40). For this purpose, the step of "depositing a first layer of arsenic atop a semiconductor" is introduced (column 1, lines 61-62) in order "to provide sufficient arsenic within the silicon layer (whether such layer be amorphous silicon or polycrystalline silicon) to enhance or promote an increase in the size of individual polysilicon grains grown within the silicon layer..." (column 2, lines 13-17)

The reference does not show producing a doping at a surface of the semiconductor substrate, as recited in claim 1 of the instant application.

It appears that it is the Examiner's position that "depositing a first layer of arsenic atop a semiconductor" (column 1, lines 61-62) teaches producing a doping at a surface of the semiconductor substrate, as recited in claim 1 of the instant application. Applicants disagree with this statement for several reasons, which will be set forth below.

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According to Random House Dictionary of the English Language, the term doping is defined as a method of adding a dopant to a pure semiconductor to change its electric behavior, the dopant being an impurity added intentionally in a very small, controlled amount to a pure semiconductor to change its electric behavior". Turner et al. do not disclose that the arsenic be added to a pure semiconductor. Furthermore, Turner et al. do not disclose that the arsenic is an impurity that is added to the semiconductor wafer. Turner et al. do disclose that the arsenic is deposited atop a semiconductor wafer, such a deposition atop the wafer does not change the electric behavior of the wafer. Therefore, due to the reasons given above, the depositing of a first layer of arsenic atop a semiconductor wafer disclosed by Turner et al. does not meet the definition of the term "doping".

Since claim 1 is believed to be allowable, dependent claims 8, 9, 12-16, 19, and 20 are believed to be allowable as well.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

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Even though the claims are believed to be patentable, further discussion of the Turner et al. reference is given below.

It is applicants' position that claim 1 is also not obvious over Turner et al., since Turner et al. do not give any suggestion in the direction of the present invention because the methods and problems to be solved by claim 1 and Turner et al. are very different.

Turner et al. teach providing an improved technique for enhancing or enlarging the size of polysilicon grains in a polysilicon film (column, 1, lines 37-39). The arsenic layer is merely used "to provide sufficient arsenic within the silicon layer (whether such layer be amorphous silicon or polycrystalline silicon) to enhance or promote an increase in the size of individual polysilicon grains grown within the silicon layer during the first annealing step" (column 2, lines 13-17). A later step states "a second anneal of the wafer is conducted for a time period sufficient to outgas arsenic from the polysilicon layer" (column 3, lines 37-39). It is clear from these statements that the arsenic layer of Turner et al. is not intended for producing the "buried doping" of claim 1 of the instant application.

The goal of the present invention is to produce a buried doping with "steep doping profiles" (page 4, lines 15-16). Turner et al. do not mention anything related to doping layers or doping profiles. Turner et al. only mentions "outgassing arsenic from the polysilicon layer". Therefore, a person of ordinary skill in the art would not use the teaching of Turner et al. to solve the problem of providing a buried doping with a steep doping profile.

In view of the foregoing, reconsideration and allowance of claims 1-20 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel respectfully requests a telephone call so that, if possible, patentable language can be worked out.

If an extension of time for this paper is required, petition for extension is herewith made.

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Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner & Greenberg P.A., No. 12-1099.

Respectfully submitted,

  
For Applicant(s)

Alfred K. Dassler  
52,794

AKD:cgm

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Lerner and Greenberg, P.A.  
Post Office Box 2480  
Hollywood, FL 33022-2480  
Tel: (954) 925-1100  
Fax: (954) 925-1101

FAX RECEIVED  
MAY 05 2003  
TECHNOLOGY CENTER 2800

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Marked-up version of the claims:

Claim 2 (amended). The process according to claim 1, [which comprises during the applying step, forming the amorphous layer to extend] wherein a further amorphous layer that extends to a predetermined depth into the semiconductor substrate[, and] is produced by ion bombardment before a heat treatment step.

Claim 4 (amended). The process according to claim 2, which comprises forming the further amorphous layer to have a thickness of between 500 - 1000 nm.

Claim 11 (amended). The process according to claim [9] 10, which comprises carrying out the ion implantation process using ions selected from the group consisting of B, P, As, In and Sb ions.

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